

LETTERS TO THE EDITOR

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The Editor urgently requests correspondents to keep their letters as short as possible. The pressure on his space is so great that it is impossible otherwise to ensure the appearance even of communications containing interesting and novel facts.]

Urticating Organs of Planarian Worms

THERE exist, as is well known to all comparative anatomists, in the skin of most planarian worms certain rod-like bodies (Stäbchenkörperchen of German authors) concerning the function and homologies of which there has been considerable speculation and difference of opinion. By some authors these bodies, which always at an early stage of their existence are contained in cells, "the rod-cells" have been compared to the thread-cells or nematocysts of coelenterata, the rod-cells being considered homologous to or possibly homogenous with these coelenterate nematocysts. In the July number of the *Quarterly Journal of Microscopical Science*, vol. lxvii., new series, 1877, I published a paper on the structure of several forms of land planarians obtained by me during the voyage of H.M.S. *Challenger*. In this paper is described and figured the structure of the rod-cells of several genera of land planarians as observed in the fresh and living condition. In an American form *Geoplana flava* and also in a *Geoplana* from New Zealand and a *Rhynchodemus* from the Cape of Good Hope rod-cells were observed in which the rods are much longer than the cells and are in their quiescent condition coiled spirally within the cells (*i.e.*, Pl. xx. Figs. 15, 20, 21, 22, 23), but which rods are shot out from the cells and protruded for a long distance beyond the surface of the epidermis when the animal is compressed or irritated. Such probably is the mature condition of the cells in question in all land planarians. Mecznikow has described a somewhat similar form of cell as existing in his *Geodesmus bilineatus*.

In some microscopic sections of land planarians hardened in alcohol, the shot-rods or threads may be seen in abundance when closely looked for, projecting from the edges of the section of the epidermis. The demonstration of the spiral coiling of the rods within the cells, and of their protrusion on irritation, would at first sight seem to ally these bodies more closely than ever with coelenterate nematocysts, but there is this great difference between the two structures, that several rods are present in each cell in the planarians, and that the rods are solid and apparently free within the cell, and when protruded by the bursting of the cell are shot clear of it. In coelenterates, as is familiarly known, the thread is continuous with the cell and hollow, and is everted in the act of protrusion.

In the summary of my paper above referred to (*J.C.*, p. 292) I suggested that it would be interesting to test the action of the rod bodies of land planarians by applying a living worm to the tongue and observing whether urtication was produced. I wrote at the time to my friend, Mr. Thwaites, F.R.S., curator of the Royal Botanic Gardens at Peradeniya, Ceylon, and asked him to make the experiment, which he did forthwith, and the result shows that planarians do undoubtedly produce urtication in much the same way as coelenterates, and there can be no doubt that this function is performed by the rod-bodies, which are thus weapons of defence, and no doubt used also to secure prey.

Mr. Thwaites writes:—"I have lost no time before attending to your request touching the planarians. I applied the tip of my tongue to two of them brought fresh and lively to me, and quite sensible was I to a feeling of unpleasant tingling, and it was accompanied with slight swelling. The sensations very similar to what is experienced upon a slight scalding. The planarian itself evidently felt very uncomfortable, as it became dilated laterally to a considerable extent during contact with the tip of the tongue, though it soon recovered its normal condition."

H. N. MOSELEY

New University Club, St. James's Street, S.W.

The Satellites of Mars

IT seems worthy of notice that the prophetic genius of Homer has already not only identified but even given names to the two satellites of Mars. I allude, of course, to the passage in the fifteenth book of the Iliad, where Ares is preparing to descend to the earth (possibly this refers to an unusually near approach at opposition, as at the present time):—

"Ος φάτο·καὶ δὲ ἵππους κέλετο Δεῖμον τε Φόβον τε
ζευγρύμεν. . . ."

Il., xv. 119.

which Pope renders—

"With that he gives command to Fear and Flight
To join his rapid coursers for the fight."

Deimus and Phobus are not, perhaps, very euphonious names; but astronomers will not lightly reject the authority of Homer.

Eton, September 29

H. G. MADAN

On the Coming Winter

HAVING recently computed the remaining observations of our earth-thermometers here, and prepared a new projection of all the observations from their beginning in 1837 to their calamitous close last year—results generally confirmatory of those arrived at in 1870 have been obtained, but with more pointed and immediate bearing on the weather now before us.

The chief features undoubtedly deducible for the past thirty-nine years, after eliminating the more seasonal effects of ordinary summer and winter, are:—

1. Between 1837 and 1876 three great heat-waves, from without, struck this part of the earth; viz., the first in 1846-5, the second in 1858-9, and the third in 1868-7. And unless some very complete alteration in the weather is to take place, the next such visitation may be looked for in 1879-5, within limits of half a year each way.

2. The next feature in magnitude and certainty is, that the periods of minimum temperature, or cold, are not either in, or anywhere near, the middle time between the crests of those three chronologically identified heat-waves, but are comparatively close up to them *on either side*, at a distance of about a year and a half, so that the next such cold wave is due at the end of the present year.

This is, perhaps, not an agreeable prospect, especially if political agitators are at this time moving amongst the colliers, striving to persuade them to decrease the out-put of coal at every pit's mouth. Being, therefore, quite willing, for the general good, to suppose myself mistaken, I beg to send you a first impression of plate 17 of the forthcoming volume of observations of this Royal Observatory, and shall be very happy if you can bring out from the measures recorded there, any more comfortable view for the public at large.

PIAZZI SMYTH

Astronomer-Royal for Scotland
Royal Observatory, Edinburgh, September 27

The Australian Monotremes

I OBSERVE in NATURE (vol. xvi. p. 439) that a doubt arises respecting the *Echidna* or Australian porcupine (recently renamed *Tachyglossus*) and the *Ornithorhynchus* being found in Northern Australia. It does exist in Queensland, but how far north it is impossible to decide until we are better acquainted with that extensive territory. The fact of one having been found by Mr. Kennedy, as mentioned by Mr. Forbes at Plain Creek in lat. 21° S. is, as far as the published statement can be depended upon, correct, and was never considered by any Australian in Queensland as a matter of doubt, as they were well acquainted with the animal; but whether the *Tachyglossus* was the same or of a different species I do not consider has been sufficiently noticed; whether it was the *Tachyglossus hystrix*, or with sufficient distinctive characters, as has been recently found in that of New Guinea to make it a new species, is not known, as ordinary travellers are not able to distinguish those characteristic differences which would immediately strike the experienced naturalist. The species found in the vicinity of Darling Downs, &c., is evidently the *Tachyglossus hystrix*, and from a recent letter received from my son, Mr. G. F. Bennett, he finds no difficulty in procuring specimens of this species near Foooomba by offering rewards for those procured at certain intervals of time, to enable him to carry out his investigations on the mode of generation of the *Monotremata*, and if possible to procure the impregnated uterus of that animal, as well as that of the *Ornithorhynchus*, as in both animals it no doubt will be identical. As far as regards the rudimentary pouch in the *Echidna* it is only able to be found in that animal during the breeding season, and I could never detect it at any other time. It is mentioned by Prof. Owen in his memoir on the young of the *Echidna* (*Philosophical Transactions*, 1865, p. 678), and indeed it has been a well-known fact for some period of time, as some years ago I doubted the assertion and public attention was most particularly drawn to it, and the fact was ascertained beyond doubt even before the publication of Prof. Owen's paper.

The *Ornithorhynchus* being an aquatic animal does not possess a pouch at any time. With respect to the New Guinea species of *Echidna*, the question whether the *Tachyglossus lawsei* and *T. bruijnii* are distinct species can now be decided, as I observe that examples of both sexes of *T. bruijnii* have been obtained in the mountains on the north coast of New Guinea at an elevation of about 3,500 feet. That a new and somewhat analogous species of *Tachyglossus* may yet be discovered in Northern Australia I consider very probable.

GEORGE BENNETT

September 29

P.S.—By letters from Sydney dated August 4 no intelligence has been received from Sig. D'Albertis since his departure for the Fly River in May last.

Are there no Boulders in Orkney and Shetland?

In your impression of the 13th inst. (p. 418), there is an interesting letter from Mr. Laing, M.P., stating that there are no boulders in Orkney or Shetland. He says that having "an intimate personal acquaintance with these islands, which are my native county, and almost every yard of whose surface and shores I have explored with rod and gun," . . . "I can assert positively that I never saw (in them) a boulder or perched block, or the trace of any till, or boulder clay, kame, eskar, raised beach, or other form of glacial or marine action."

Mr. Laing's object in drawing the attention of geologists to these facts is, that "if true, they seem to afford a crucial test of the truth or falsehood of some of the most important theories of modern geology."

Mr. Laing observes that in Orkney there could be no boulders, &c., because "there were no glaciers, there being no great local mass of mountains to produce them."

As regards Shetland, Mr. Laing says he cannot speak with the same confidence. "Still, having travelled over a great part of the principal islands, I can assert that I have never seen in them either, any traces of glacial action."

Mr. Laing having invited information on this subject, Prof. Geikie has published an article in the same number of your paper (p. 414), controverting Mr. Laing's statements, and maintaining that the facts ascertained by him and his colleagues in the Scotch Geological Survey establish that these islands form "no exception to the general glaciated condition of Scotland."

In corroboration, so far, of the Professor's statement, that there are in Orkney and Shetland "many transported blocks of gneiss, schist, and other rocks foreign to the immediate locality" of the blocks, I need only refer to the following list of boulders reported to the Edinburgh Royal Society Boulder Committee.

IN ORKNEY.

Eday Island.—Conglomerate B. $12 \times 7 \times 1\frac{1}{2}$ feet, = about 8 tons weight. Situated near top of a hill 250 feet above sea. No conglomerate rock in Eday, but there is in Stronsay Island.

Firth and Stennis.—White pebbles of freestone on the hills. But there are no white freestone rocks in this island. It is all old red.

Sanday.—Gneiss B. $7 \times 6 \times 2\frac{1}{2}$ feet = about 14 tons. No gneiss rocks on this island. Nearest island with gneiss rocks is Stromness, 30 miles distant, and in Shetland, still more distant.

Walls.—Lydian stone B. $9 \times 7 \times 6$ feet = about twenty-eight tons. Sandstone is the prevailing rock.

Stromness Island.—Two granite boulders lying on red sandstone rocks—distant, one a quarter of a mile, the other one mile from granite hills.

IN SHETLAND.

Bressay.—A number of boulders here, of a rock foreign to the island. One of them is $10 \times 7 \times 4$ feet. Supposed to have been transported from Norway.

Housay.—On a cliff 200 feet above the sea, rounded blocks resting on knolls of polished rock.

Neay.—Large perched blocks, some many tons in weight.

Sumburgh Head.—Conglomerate B. lying on sandstone rock.

Where can it be supposed that these boulders come from?

Prof. Geikie thinks there were glaciers, at all events, in one of the islands, viz., Hoy, and even "separate glaciers" in all the valleys of that hill, whose top is only 1,550 feet above the sea. I feel great difficulty in subscribing to that opinion; I rather agree with Mr. Laing, that there could be no glaciers, for want of a sufficient "mass of mountain region to produce them." Even if in Hoy glaciers could have been formed on a hill the highest peak of which is only 1,550 feet above the adjoining sea, what is to be said of those boulders which are on islands where

the hills do not exceed 500 or 200 feet, and in which there are no rocks of the same nature as the boulders?

Prof. Geikie refers to the rock striations in Orkney and Shetland (which Mr. Laing seems not to have discovered) as additional proofs of glacial action. If these striations had been caused by glaciers, the direction of the striae would vary with the direction of the different valleys in which the glaciers moved. But this is found not to be the case. Prof. Geikie says that both in Orkney and in Shetland the movement of the ice has been on the "whole along a north-west and south-east line." He refers to reports by his colleagues, Mr. Peach and Mr. Horne, in corroboration of his statements.

In looking into Mr. Peach's report, I find that he specifies the striae on the rocks of Shetland as running in various directions. In Unst, the most northern island, he says "the destroying force (the nature of which force, however, he avoids indicating) coming against a hill (called the 'Muckle Heug,' 500 feet high) on its north-west flank, had been partially turned by the hill into a valley (which he names) and made to produce the well-known phenomenon of 'crag and tail'"—the crag or bared rock being on the north side of the hill.

Mr. Horne in his paper also describes the striae in Shetland as running in various different directions. Some of the striae on the rocks, and the boulders on the surface, indicated, as he thought, ice action from east to west. "In addition to these, however, others (he says) were found, which could not have been produced by ice-shedding in the ordinary way. These cross the island, regardless of its physical features, and are often at right angles to the newer set."

These facts, I venture to submit, may be explained by supposing that the Shetland and Orkney Islands, when still under the ocean, were subjected to the action of Arctic currents loaded with icebergs and shore ice. We know that in the Arctic regions now, fragments of rocks are by these means carried about in various directions, and dropped on the sea-bottom; whilst the rocks at the sea bottom are ground down, polished and striated by the hard stones and gravel pushed forward by icebergs. The existence of Arctic currents from north-western points has indeed been already well established by study of the boulders and striated rocks found along the west coasts of Caithness, Ross, Argyll, and the islands of Lewis, Harris, and Uist.

The inference of Mr. Peach from what he saw near Lerwick was, that there "the direction the drift came from is evidently northerly." "The destroying force" to which Mr. Peach refers as having swept across the island of Unst baring a hill up to a height of 500 feet on its north-west flank, could have been no other than an Arctic current loaded with ice.

These facts establish points of the highest geological interest. They indicate a submersion of the northern parts of Europe under the ocean to the extent of many hundred feet, and the non-existence of any gulf-stream flowing through the North Atlantic. The Isthmus of Panama requires to be depressed only 350 feet, to allow that stream to flow into the Pacific.

The separate question of "Raised beaches" mooted by Mr. Laing and discussed by Prof. Geikie, I do not enter on. Both of these authorities agree that there are no raised beaches in Shetland and Orkney. It is indeed very curious that such should be the case, considering that they exist along the Caithness coast, and in every other part of the kingdom, including Ireland. I may, however, notice that Mr. Peach in his Report on Shetland speaks of a "raised beach" as having been seen by him there.

Milne Graden, Coldstream, N.B. DAVID MILNE HOME

Fertilisation of Flowers by Birds

AMONG the "Biological Notes" in NATURE, vol. xv. p. 416, there is one referring to the agency of birds in effecting the fertilisation of flowers. A few weeks before reading this note I was induced to suspect that many flowers might be dependent wholly or in part on the visits of small birds for their effectual fertilisation by observing that a very considerable number of birds shot at that time had the plumes of the forehead and the lores thickly dusted with pollen. This fact was noticed in several species of *Dicaeina* and *Nectariniina*, in the *Loriculi*, and even in a glossy starling (*Calornis panayensis*), which latter is mainly a frugivorous bird. Both the sun-birds and flower-peckers are fruit-feeders to a certain extent; but they also prey on minute insects, in search of which (and possibly of the nectar sometimes) they diligently probe the corollas of numerous flowers, and on withdrawing their heads a portion of the pollen remains in many instances adhering to the plumage bordering the bill, and is carried away and introduced into the next blossom visited.